Greetings and welcome to the **May 2013** edition of the WDFW Climate News Digest. The purpose of this digest is to provide highlights of relevant climate change news, events and resources for WDFW staff. Feedback or suggestions for items to include in future editions are much appreciated – many *thanks* to those who have sent links and references and please keep them coming. Note that previous editions of the newsletter are now stored on the Habitat Program Sharepoint site -- http://sharepoint.dis.wa.gov/dfw/habitat/climatechange/default.aspx.

WHAT'S HAPPENING AT WDFW?

Selected projects, agency resources and initiatives

Habitat hosts climate workshop

The Habitat Program Summit, held last week in Wenatchee, included a workshop on "Learning how to integrate climate change into key decisions". After a brief overview of climate adaptation initiatives in the agency, participants discussed what makes a program sensitive or vulnerable to changes in climate and how to think about developing options to increase resilience. The group then focused on one activity area – maintaining shoreline function and processes, and explored WDFW activities and decisions for this activity, sensitivities to climate change, and potential adaptation options. For more information, or if you are interested in hosting a similar work session, please contact Lynn.

CLIMATE ADAPTATION AT OTHER ORGANIZATIONS

Climate in the Parks: Innovative Climate Change Education in Parks

The Institute at the Golden Gate's signature climate change publication, ***Climate in the Parks: Innovative Climate Change Education in Parks***, highlights some of these innovative, locally relevant, and action-oriented climate education programs occurring in parks around the globe. A copy of the report can be downloaded here, and more information on the Institute's Climate Education & Parks program can be found here.

LEARNING OPPORTUNITIES

Thursday, May 30 at 11:30, Pacific, "Impacts of melting glaciers on nutrient supply and coastal ecosystems of the northern Gulf of Alaska"

The northern Gulf of Alaska (GoA) maintains a productive ecosystem, with commercially important fisheries. Virtually all of the many glaciers that line the northern GoA coast are retreating, yet the impacts on the marine ecosystem are poorly understood. This project carried out a set of frequent field observations in a network of tributaries of the Copper River, the single largest source of fresh water to the GoA (and a watershed with substantial glacial coverage).

YOU MUST REGISTER TO JOIN THIS WEBINAR VIA WEBEX

https://doilearn.webex.com/doilearn/k2/j.php?ED=27133673&UID=43...

<https://doilearn.webex.com/doilearn/k2/j.php?ED=27133673&UID=43769103&HMAC=387fb8009d05ed8ccc4cf4dea0ac1fbe027f51a8&RT=MiMxMQ%3D%3D&FM=1>

June 4th, 11:00, "Effective Citizen Science for Coastal and Marine Environments: Reef Check California, COASST, and MPA Watch".

Citizen science has particular interest and appeal for marine data collection because the marine environment is difficult and expensive to survey. On this webinar, three marine citizen science experts from the U.S. West Coast will describe how their programs work and answer questions from webinar participants about how to get an effective citizen science program off the ground. The presentations will run for ~45 min, but the presenters will be available for 90 min to allow ample time for questions/discussion. Featured presenters and projects are:

- Jan Friewald from Reef Check California. Learn more at www.reefcheck.org/rcca/rcca_home.php
- Julia Parrish of the University of Washington. Learn more at http://depts.washington.edu/coasst/what/vision.html
- Sarah Sikitch of Heal the Bay, learn more at www.healthebay.org/get-involved/volunteer/mpa-watch.

Register for the webinar at https://www1.gotomeeting.com/register/519867936.

June 10th, 2013, Ocean Acidification Workshop, Department of Ecology HQ Building, Lacey, WA, 10:00-12:00, Dr. Amy Snover, Director of the Climate Impacts Group at the University of Washington, will present scientific information on climate change and ocean acidification in the Pacific Northwest and Washington State. Hedia Adelsman (Ecology) will provide an overview of mitigation and adaptation activities in the state and Ecology's role in climate change and ocean acidification. Limited seating is available for non-Ecology participants – you must RSVP with Lynn in advance to attend this workshop.

EPA to Host Free Webinar Series on Climate Change Adaptation for States, Tribes and Local Governments from June 3-12, 2013

EPA's Office of Strategic Environmental Management and North Carolina State University will host a virtual symposium on climate change adaptation for states, tribes, and local governments in a series of on-line sessions over two weeks in June. The series will bring together state, tribal, and local stakeholders; EPA representatives; and experts from a variety of sectors to consider the impact of EPA's new Climate Change Adaptation Plan on the implementation of federal environmental programs and to present case studies, tools, and solutions to some of the most pressing climate change adaptation challengesFor more information and to register, visit: http://climate-adaptation-symposium.org/index.html.

June 18-20 Conference on "Understanding Sea Level Rise in the Face of Extreme Events and an Uncertain Economy" Fort Lauderdale, Florida (Inaugural Rising Seas Summit) http://www.icleiusa.org/training-events/2013-rising-seas-summit.

WEBINAR RECORDINGS

Forests and Climate Change

If you missed the C3 (Climate Change Collaborative) April 23 presentation by USFS-Dave Peterson on **Forests and Climate Change** (focus on Pacific Northwest) see: http://bit.ly/C3webinars

How Will Climate Change Affect Bird Distribution and Abundance in the North Pacific?

A project supported by the North Pacific LCC has created bird distribution and abundance models that consider climate change. These models can be used to inform natural resource management through a web based decision support tool demonstrated in this webinar recording.
Webinar Link

RESOURCES

Presentations Available Online from National Climate Assessment Workshop on "Sustaining Assessments of Oceans and Coasts"

The National Climate Assessment (NCA) organized a workshop on "Sustaining Assessments of Oceans and Coasts" in Washington, D.C. on April 22-23, 2013 at which participants discussed key information/science needs necessary for advancing and sustaining climate assessments of oceans and coasts, relevant needs of decision-makers and managers, and creative mechanisms for building capacity to conduct coastal and ocean assessments. For more information, visit: https://sites.google.com/a/usgcrp.gov/nca-workshop-on-sustaining-national-climate-assessments-of-oceans-and-coasts/agenda

Natural Resources Defense Council and American Rivers Release Guide for States on Preparing for Water-Related Impacts of Climate Change

The publication, "Getting Climate Smart: A Water Preparedness Guide for State Action," combines practical planning guidance with real world examples and case studies to demonstrate how states across the U.S. can develop and implement a climate preparedness plan to protect public health, communities, and natural resources. Highlights include: a six-step planning process for state governments, water managers, and other stakeholders; a top ten list of no regrets strategies that are cost-effective and flexible, providing both short-term and long-term benefits; a strategy toolbox detailing more than 600 strategies for dealing with climate-related risks across seven key sectors; and a resource bank containing information on additional planning and funding resources. To view the guide, visit: www.nrdc.org/water/climate-smart.

Case studies demonstrate strategies for mitigating consequences of climate change

Among presentations at the National Climate Change Adaptation Forum April 2-4, 2013 were case studies of projects in different ecosystems that are addressing the effects of climate change. Short videos tell three environmental organizations' stories unfolding in markedly different locations (posted at Beyond Seasons's End).

Wildlife Corridors and Climate Change in the Northwest *[Summary courtesy of the Climate CIRCulator]*

A new study explores the potential for maintaining wildlife corridors in the northwest given future climate change conditions. Corridors defined will allow migration along spatial temperature gradients, keeping similar habitat conditions and threading among human land-uses and barriers. Researchers used a coarse-scale analysis of current land-uses highlighting connectivity among low human influence areas coupled with maps of current temperature patterns and using a "cost-distance" algorithm to estimate potential wildlife movement.

Nuñez, T. A., J. J. Lawler, B. H. Mcrae, D. J. Pierce, M. B. Krosby, D. M. Kavanagh, P. H. Singleton, and J. J. Tewksbury. 2013. Connectivity Planning to Address Climate Change. *Conservation Biology*. doi: 10.1111/cobi.12014.

6 Climate CIRCulator Featured Articles *(Subscribe here)*

The Climate CIRCulator is brought to you by The Pacific Northwest Climate Impacts Research Consortium (*CIRC*) and The Oregon Climate Change Research Institute *(OCCRI)*:

The Impact of Beetle-Induced Tree Mortality on Water Quality
Reconstructing 11,300 Years of Temperature Data to Study Warming
National Climate Assessment Northwest Regional Town Hall
The Effect of Climate Sensitivity on Ocean Acidification
Evidence of Increasing Frequency of Intense Precipitation in the Olympic Peninsula
The Rain-Shadow Effect in the Washington Cascades

A new report summarizes climate related challenges for the North Pacific Landscape Conservation Collaborative

National Wildlife Federation worked with the North Pacific Landscape Conservation Cooperative (NPLCC) and University of Washington Climate Impacts Group to identify climate change-related challenges, needs, and opportunities for conservation in North America's coastal temperate rainforests and coasts. The 195 resource managers, conservation practitioners, and researchers we engaged requested four types of support to address the challenges they face: decision-support systems and tools; collaboration and other capacity-building activities; new or different science, data and information; and, science communication and outreach.

Download the full report: *Advancing Landscape-Scale Conservation: An Assessment of Climate Change-Related Challenges, Needs, and Opportunities for the NPLCC (pdf)*

CLIMATE SCIENCE NEWS

Heat-Trapping Gas Passes 400 parts per million milestone

(summary from NY Times article published May 10, 2013)

The level of the most important heat-trapping gas in the atmosphere, carbon dioxide, has passed the milestone of 400 parts per million -- just an odometer moment in one sense, but also a sobering reminder that decades of efforts to bring human-produced emissions under control are faltering. From studying air bubbles trapped in Antarctic ice, scientists know that going back 800,000 years, the carbon dioxide level oscillated in a tight band, from about 180 parts per million in the depths of ice ages to about 280 during the warm periods between. The evidence shows that global temperatures and CO_2 levels are tightly linked. Indirect measurements suggest that the last time the carbon dioxide level was this high was at least three million years ago, during an epoch called the Pliocene. Geological research shows that the climate then was far warmer than today, the world's ice caps were smaller, and the sea level might have been as much as 60 or 80 feet higher.

Tropical upper atmosphere 'fingerprint' of global warming *(from Science Daily)*

The winds of the quasibiennial oscillation in the tropical upper atmosphere have greatly weakened at some altitudes over the last six decades, according to a new study. The finding is consistent with computer model projections of how the upper atmosphere responds to global warming induced by increased greenhouse gas concentrations. In the tropics at heights more than 10 miles above the surface, the prevailing winds alternate between strong easterlies and strong westerlies roughly every other year. This slow heartbeat in the tropical upper atmosphere, referred to as the quasibiennial oscillation (QBO), impacts the winds and chemical composition of the global atmosphere and even the climate at Earth's surface**.**

SPECIES AND HABITATS

San Francisco Marshes at risk from sea level rise

San Francisco Bay — which has already lost the majority of its marsh habitat since the 19th Century — could lose even more marshes by the year 2100, due to sea level rise. These are the findings of a recently published U.S. Geological Survey report. Researchers from the USGS Western Ecological Research Center and the USGS California Water Science Center surveyed the elevation, water levels, sediment and vegetation at 12 marshes near Petaluma River, San Pablo Bay, Napa River and South San Francisco Bay. Using a new computer model, they found that 95 percent (4,798 acres) of these 12 marshes will be inundated by 2100 under a four-foot sea-level rise scenario — losing their vegetation and being converted into tidal mudflat habitats This Science Feature can be found at: http://www.usgs.gov/blogs/features/usgs_top_story/san-francisco-bay-could-lose-marshes-to-sea-level-rise-by-2100-2/

Potential effects of climate change on streambed scour and risks to salmonid survival in snow-dominated mountain basins

This research examines snowmelt-dominated basins in northern latitudes which provide critical habitat for salmonids, potential shifts in the frequency, magnitude, and timing of flows that can scour incubating embryos. A general framework is presented to examine this issue, using a series of physical models that link climate change, streamflow, and channel morphology to predict the magnitude and spatial distribution of streambed scour and consequent risk to salmonid embryos at basin scales. Goode et al. 2013, Hydrol. Process. 27, 750–765, DOI: 10.1002/hyp.9728

Life scientists present new insights on climate change and species interactions (from Science Daily)

A research team from UCLA have looked at the impact temperature changes can have on the rate at which an organism uses energy, known as the metabolic rate. This fundamental process governs many aspects of an organism's life, including how much food it will eat, how fast it can move, how much it sleeps and how fast its heart beats. The team makes predictions about how an organism's activity -- and thus the broader ecology -- are affected by temperature. In the current research, Savage and his colleagues examined how organisms' different physiological responses to rising temperatures could impact what are known as consumer-resource interactions. These are interactions between two organisms that lead to a "feeding" event -- a prime example being a predator (consumer) and its prey (resource).

Pinpointing how nature's benefits link to human well-being

What people take from nature -- water, food, timber, inspiration, relaxation -- are so abundant, it seems self-evident. Until you try to quantitatively understand how and to what extent they contribute to humans. Scientists at Michigan State University's Center for Systems Integration and Sustainability have developed a new integrated approach to measure human dependence on ecosystem services and human well-being so as to promote the understanding of the linkages between them -- an important step toward improved understanding, monitoring and management of coupled human and natural systems. "Climate change, energy and food insecurity, biodiversity loss and water shortages all have raised the stakes," said Jianguo "Jack" Liu, Rachel Carson Chair in Sustainability and CSIS director. "If we can't quantify the complex relationships between ecosystem services and human well-being, both ecosystems and humans will suffer and will not be sustainable."

Wu Yang, Thomas Dietz, Wei Liu, Junyan Luo, Jianguo Liu. Going Beyond the Millennium Ecosystem Assessment: An Index System of Human Dependence on Ecosystem Services**. *PLoS ONE*, 2013; 8** (5): e64581 DOI: 10.1371/journal.pone.0064581

Economic Value of Tidal Marshes

The Horizontal Levee, The Bay Institute's groundbreaking study about the economic value of tidal marshes, demonstrates conclusively that nature performs critical functions for society. During the current era of sea level rise, the forgotten marshlands of San Francisco Bay have become a critical adaptation tool. http://bay.org/bay-restoration/the-horizontal-levee

POLICY AND MANAGEMENT - MITIGATION AND ADAPTATION

Implications Of Global Climate Change For Natural Resource Damage Assessment, Restoration, And Rehabilitation

In the attached paper, the authors describe how global climate change will challenge each of the steps of the Natural Resource Damage Assessment, Restoration and Rehabilitation process and offer eight recommendations to improve these processes in light of climate change.

This American Life: Hot In My Backyard

"After years of being stuck, the national conversation on climate change finally started to shift — just a little — last year, the hottest year on record in the U.S., with Hurricane Sandy flooding the New York subway, drought devastating Midwest farms, and California and Colorado on fire. Lots of people were wondering if global warming had finally arrived, here at home." In this episode of the NPR radio program "This American Life", stories about this new reality.

Yale Project on Climate Change Communication and George Mason University Center for Climate Change Communication Release Report on Relationship between Extreme Weather and Public Attitudes

This report, entitled: "Extreme Weather and Climate Change in the American Mind, April 2013," takes a look at the relationship between extreme weather and public attitudes on human-driven climate change. To learn more and view the report, visit: http://environment.yale.edu/climate-communication/article/extreme-weather-public-opinion-April-2013